# VAA-Weekly-Progress

01/21-01/28

# Context

- Brainstormed the structure of our research
    - 3 main topics (Species Similarity, Keypoint Definitions, Our data)
- Template of research question: Do we get better keypoints if we train with more similar species?
    - What is a “better” keypoint? How to measure what is “better” (Accuracy, OKS, downstream tasks)?
    - How to find “similar” species?

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# Goals

- Develop potential research questions
    - Keypoint Evaluation - Medha, Claire, Shaan
    - Species Similarity - Josh, Parth, Zian
- Label keypoints for 10 images of our data each week

# How have existing keypoint datasets developed?

- AnimalPose builds off VOC2011 human keypoint dataset
  - Focus on shifting domains from human to animal to make dataset creation easier in their weakly-and semi-supervised cross domain adaptation (WS-CDA) scheme
- AP10k also references the human pose keypoints in their keypoint scheme, but doesn't mention how they defined the points
- Animal Kingdom dataset uses keypoints corresponding to 23 human keypoints
  - For more difficult animals like birds: "shoulders, elbows, and wrists are defined in accordance to how their upper limbs move"

# What we think a “good” keypoint is?

Previous models have not explained why they chose the labeling scheme they did, and mostly based it on adapting from a human pose definition.

2 ways we have thought of defining a “good” keypoint

- Using Anatomy of the Antelope to define a good keypoint
    - Would need more domain knowledge of the skeletal structure of antelopes and how they move
- Using labeler consistency
    - We are leaning towards this direction because it is quantifiable by comparing variation in labels across labelers

# Experimentation to justify our choice

- Come up with multiple keypoint definitions (Josh had an interesting idea for a way to define keypoints)
- Quantify labeling consistency by labeling multiple images with the definitions and compare across different labelers (OKS)
- Then label AP10k images with the “best” definition from the previous part and train 2 models (One with AP10k default labeled images, and one with our labels on AP10k data) and compare performance (accuracy) to justify why our keypoint definition is better than AP10k

# Species Similarity

Main Takeaway/Discussion: Taxonomy vs Morphology.

Main Ideas: Limb ratios, Centroid Variation, Species classifier, Self supervised learning.

Some Paths:

- Perform above methods and evaluate best similarity metric that improves the models performance on antelopes.
- Possibly try out combining all of these approaches into one large approach (more on the document given below).

More details:

In Box go to: /spring25-team-generated-docs/Plan for Visual Similarity.pdf

https://app.box.com/s/1shg2ghyjpucipxwlistnxx8rj4ngstf

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# Next Steps

- Begin working on similarity measures for morphology-based training
    - Maybe starting with using variation relative to the centroid
- Discuss how we have decided to proceed with keypoint experimentation
- Continue labeling antelope images with keypoints

# Personal Progress

# Medha

- Looked into how existing animal keypoint datasets have defined their keypoints
- Helping in coming up with our definition of a “good” keypoint definition and appropriate experimentation to justify the choice
- Annotated antelope keypoints

# Parth

- Worked on Species Similarity slide/discussion
- Read and understood what self supervised learning is
- Annotated the antelope images with keypoints

# Claire

- Labeled antelope images on Label Studio
- Contributed to discussion regarding defining “good” keypoint definitions

# Zian

- Read the openPose article
- Annotated antelope keypoints
- Log in to the deadcat
- Read article and watch videos about self-supervised learning and image processing.
- Read part of the article “Similarity learning networks for animal individual re-identification”